37. (Original) The method of claim 36 wherein the polarization is switched between orthogonal polarization states and the at least one pulse pairs has a unique combination of polarization states.

38. (Original) The method of claim 29 wherein the polarization of each pulse in the at least one pulse pair comprises a combination of two components of orthogonal polarization states.

39. (Original) The method of claim 38 wherein the combination is time varying and individually controlled for each pulse.

40. (Original) The method of claim 38 wherein the phase of each of the two components is modulated.

41. (Original) The method of claim 40 further comprising filtering the reflected signal to produce the one or more additional signal components.

42. (Original) The method of claim 41 further comprising modulating each component using a different linear rate to form at least four separable signal components.

43. (Original) A method for determining sensor phase in an interferometric sensor system comprising:

producing an interrogation signal for an interferometric sensor array, where the interrogation signal defines at least four independent Stokes vectors;

applying the interrogation signal to an interferometric sensor array having at least one sensor;

receiving a responsive signal from the interferometric sensor array; and

computing a Jones matrix for the at least one sensor in said interferometric sensor array in response to the responsive signal.

44. (Original) The method of claim 43 wherein the producing step comprises:

modulating a state of polarization of an optical signal along a predefined path on the Poincaré' sphere to produce the interrogation signal;

45. (Original) The method of claim 43 wherein the at least four independent Stokes vectors are produced by modulating the interrogation signal using at least one of phase modulation, polarization modulation and frequency modulation.

46. (Original) The method of claim 45 wherein the modulation is at least one of continuous and step-wise.

47. (Original) A method for determining sensor phase delay in an interferometric sensor system comprising:

generating an interrogation signal for an interferometric sensor array having at least one sensor, where the interrogation signal is depolarized;

receiving a responsive signal from the interferometric sensor array using a polarization diversity receiver to separate the responsive signal into a plurality of polarization components; and

extracting from the plurality of polarization components information concerning a Jones matrix for the at least one sensor.

48. (Original) The method of claim 47 wherein the plurality of polarization components comprise horizontal, vertical, right circular, left circular, 45 degree and –45 degree.

49. (Original) The method of claim 47 wherein the interrogation signal is a frequency swept signal and the sensor array is an imbalanced array.

50-61. (Canceled)

62. (New) An apparatus for determining sensor phase delay in an interferometric sensor system, comprising:

a source for generating an interrogation signal for an interferometric sensor array having at least one sensor, where the interrogation signal is depolarized;

a polarization diversity receiver for receiving a responsive signal from the interferometric sensor array and separating the responsive signal into a plurality of polarization components; and

a processor for extracting from the plurality of polarization components information concerning a Jones matrix for the at least one sensor.

63. (New) An apparatus for determining sensor response in an interferometric sensor system, comprising:

means for generating an interrogation signal for an interferometric sensor array, where the interrogation signal comprises a plurality of pulses;

means for switching a polarization of each pulse in the plurality of pulses, where the polarization is switched between pulses;

means for receiving a responsive signal from at least one sensor within the interferometric sensor array comprising at least four independent signal components carrying information about a system response matrix associated with each of the at least one sensors; and

means for extracting information from the at least four independent signal components concerning a Jones Matrix of a sensor.

64. (New) An apparatus for determining sensor phase in an interferometric sensor system, comprising:

an interferometric sensor array having at least one sensor;

a source for producing an interrogation signal for applying to the interferometric sensor array, wherein the interrogation signal defines at least four independent Stokes vectors;

a receiver for receiving a responsive signal from the interferometric sensor array; and

a processor for computing a Jones matrix for the at least one sensor in said interferometric sensor array in response to the responsive signal.